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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/589,912

11/13/2006

Kazuaki Yazawa

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EXAMINER

VERBITSKY, GAIL KAPLAN

ART UNIT

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2855

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/589,912	<b>Applicant(s)</b> YAZAWA ET AL.	
	<b>Examiner</b> Gail Verbitsky	<b>Art Unit</b> 2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/15/08, 11/13/06, 8/18/06</u> .                              | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 13 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim 13 is dependent on multiple dependent claim 12. See MPEP § 608.01(n). Accordingly, the claim 13 has not been further treated on the merits.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-9, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guha et al. (U.S. 20050094706) [hereinafter Guha] in view of Bowden et al. (U.S. 7296928).

Guha discloses in Fig. 8 a device in the field of applicant's endeavor comprising an IR detector 802 acting as a heat detecting providing inspection images of a heat generated by a semiconductor IC/ electronic device 101 (microprocessor, semiconductor, IC) under test, wherein the IR camera 802 captures images of the electronic device 102 including temperature and temperature distribution data. The device also comprising a transparent duct wall (polished silicon, acting as a heat/ coolant spreader) 804 with a cooling fluid to cool the electronic device 101. This would imply that the thickness of the duct wall would provide the desired clearance from the

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IC. Since the wall is optically transparent, it is not in the way of the optical wavelength/ IR radiation from the IC to the sensor 802. The device has a duct/ hollow part where the coolant flows inherently having a driving mechanism making the coolant flow through.

Guha does not explicitly teach an analyzing unit.

Bowden discloses a device in the field of applicant's endeavor and states that it is very well known in the art to regulate heating by liquid cooling, using heat sinks, fans, reducing power frequency in order to operate the IC within acceptable thermal range. Thus, when the power is removed, the ambient air is acting as a coolant. Bowden teaches a processing device that analyzing and controlling all operations.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Guha, so as to have an analyzer, as taught by Bowden, in order to allow the operator to control all the processes including heating and cooling of the IC, as very well known in the art.

Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (U.S. 6162659) in view of Quintard.

Wu discloses a device in the field of applicant's endeavor comprising a silicon (transparent) heat spreader 21 tightly attached to a semiconductor IC, an external cooling mechanism for cooling the spreader.

Wu does not explicitly teach to obtaining a temperature of the IC.

Quintard discloses an apparatus for a circuit comprising:

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an IR thermograph geographically scanning (thermal profile/ distribution) over a PCB having semiconductor IC's and which is acting as a heat detecting unit which acquires the heat generation condition of a semiconductor integrated circuit from an inspection image obtained by capturing an image of the semiconductor integrated circuit by an image capturing sensor; and a cooling control unit (heat removal).

Although Quintard does not explicitly teach a cooling means, Quintard describes two phases (col. 5, line 44): heating and cooling, which implies the presence of some cooling means which controls cooling the semiconductor integrated circuit in accordance with the acquired heat generation condition (when the temperature reaches a threshold value, col. 2, lines 41-47).

Therefore, it would have been obvious to one of ordinary skill in the art the time the invention was made to modify the device disclosed by Wu so as to obtain the temperature of the IC, as taught by Quintard, in order to allow the operator or computer to know how to regulate the cooling process.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quintard (U.S.5208528).

Quintard discloses an apparatus for a circuit comprising:

an IR thermograph geographically scanning (thermal profile/ distribution) over a PCB having semiconductor IC's and which is acting as a heat detecting unit which acquires the heat generation condition of a semiconductor integrated circuit from an inspection image obtained by capturing an image of the semiconductor integrated circuit by an image capturing sensor; and a cooling control unit (heat removal).

Although Quintard does not explicitly teach a cooling means, Quintard describes two phases (col. 5, line 44): heating and cooling, which implies the presence of some cooling means which controls cooling the semiconductor integrated circuit in accordance with the acquired heat generation condition (when the temperature reaches a threshold value, col. 2, lines 41-47).

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Claims 1-4, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lloyd (U.S. 3868508) in view of Bowden et al. (U.S. 7296928) [hereinafter Bowden].

Lloyd discloses a device in the field of applicant's endeavor comprising an IR camera acquiring images of a PCB having a plurality of semiconductor IC's, a power supply to the PCB 10, an analyzer/ processor 16 for detecting temperature and temperature distribution from the camera images, determining which IC is defective (overheated/ temperature threshold) including the location of the defective IC.

Lloyd teaches to determine a defective IC, but does not teach how to control the temperature.

Bowden discloses a device in the field of applicant's endeavor and states that it is very well known in the art to regulate heating by liquid cooling, using heat sinks, fans, reducing power frequency in order to operate the IC within acceptable thermal range. Thus, when the power is removed, the ambient air is acting as a coolant. Bowden teaches a processing device that controls all operations.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Lloyd so as to remove a portion of power/ cool from the overheated IC, as taught by Bowden, in order to protect it from permanent damage.

Claims 1-5, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosengaus (U.S. 5653539) in view of Bowden.

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Rosengaus discloses the device in the field of applicant's endeavor wherein the DUT 1 having semiconductor IC's is positioned onto a heat sink or Peltier temperature control (heating/ cooling) 17 to manipulate temperature of the DUT. When heat is provided to the DUT, the CCD 7 obtains images/ thermal map of temperature and heat/ thermal dissipation/ distribution, the images are stored in a computer 8 which is also able to identify points/ location of interest on the DUT, and acting as an analyzer. The images are compared with the images received when the power off (reference images).

Rosengaus does not explicitly teach that the temperature is manipulated (heating/ cooling) when the DUT is overheated or temperature threshold has been reached.

Bowden teaches that the power can be removed in order to cool the IC that is overheated to a threshold temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Rosengaus, so as to remove a portion of power/ cool from the overheated IC, as taught by Bowden, in order to protect it from permanent damage.

Claims 9-12, 14-15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guha and Bowden as applied to claims 6-9, 16-17 above, and further in view of Fujisaki et al. (U.S. 5763950) [hereinafter Fujisaki].

Guha and Bowden disclose the device as stated above.

They do not explicitly teach the particular coolant driving/ control mechanism, the mechanism that changes the direction of the coolant.

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Fujisaki discloses a device wherein a semiconductor IC/ element is cooled by a cooling device having a driving mechanism capable of changing the direction of a coolant cooling the IC and flowing in a hollow part/ duct (Fig. 35).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Guha and Bowden, so as to have a driving mechanism for the coolant, as taught by Fujisaki, in order to regulate the cooling and provide the coolant when it is desired and in the desired velocity and amount.

With respect to the hollow part/ duct provided by boring, as stated in claims 10-11: Guha teaches a hollow part/ duct. Having the duct made by boring is a functional limitation/ recitation that has not been given patentable weight because it is narrative in form. In order to be given patentable weight, a functional recitation must be expressed as a “means” for performing the specified function, as set forth in 35 USC 112, 6<sup>th</sup> paragraph, and must be supported by recitation in the claim of sufficient structure to warrant the presence of the functional language. In re Fuller, 1929 C.D. 172; 388 O.G. 279.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gail Verbitsky whose telephone number is 571/ 272-2253. The examiner can normally be reached on 7:30 to 4:00 ET.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571/ 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Gail Verbitsky*  
*Primary Patent Examiner, TC 2800*

March 06, 2009  
/Gail Verbitsky/  
Primary Examiner, Art Unit 2855